

Defining The Problem Continued:

Quality Function Deployment

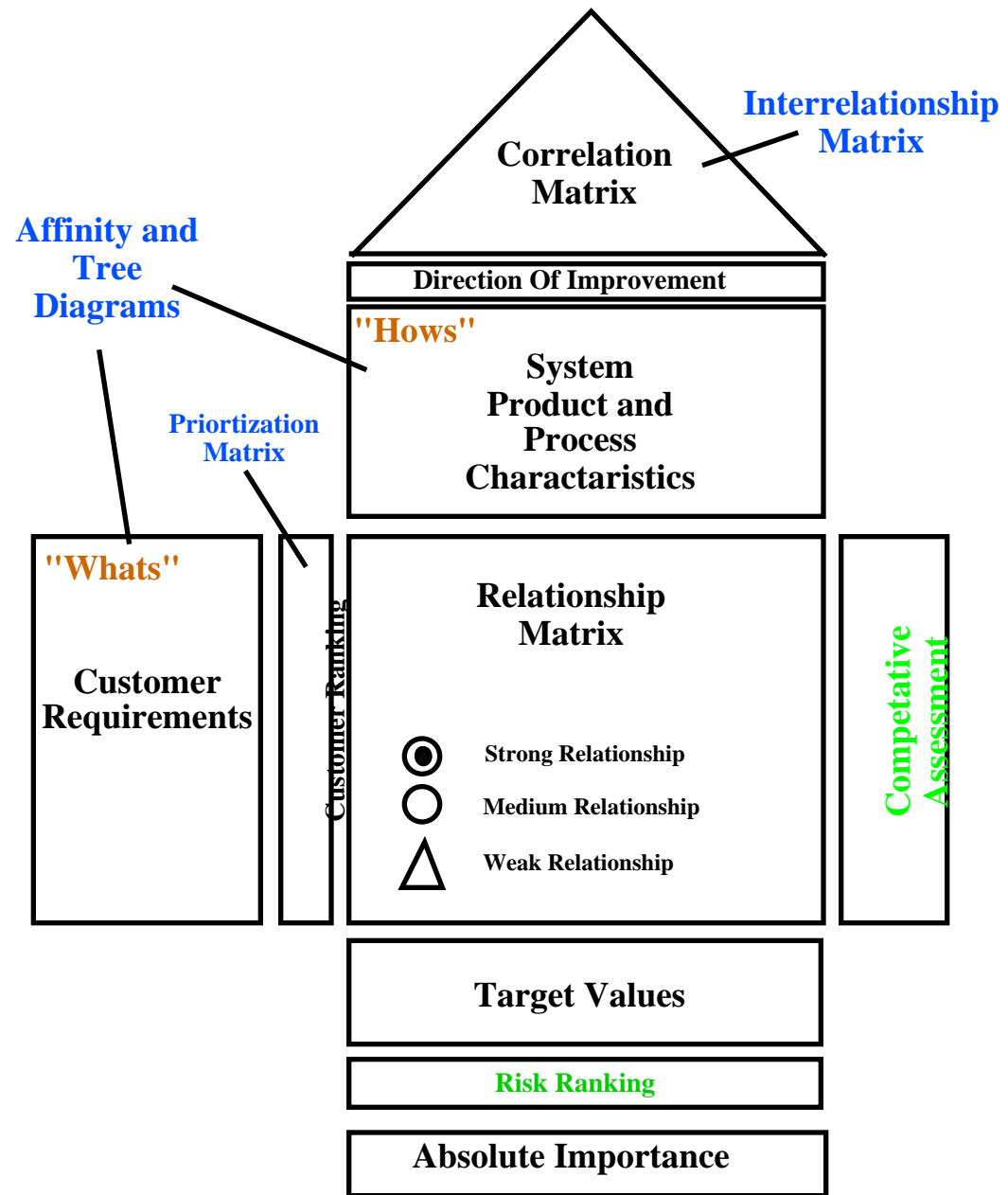
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The Flow Of The 7 M & P Tools Into a QFD matrix



What is Quality Function Deployment?

- QFD is a formal method for capturing the user's requirements and mapping them onto product and process attributes.
- The method relies on constructing a series of complementary matrices describing the association between the Voice-Of-The-Customer, the product features, manufacturing processes, and support characteristics.
- The objective of QFD is to separate the important parameters based upon the customer's desires and to understand the effect of product design on downstream processes.

Quality = Customer

- The foundation of Quality Function Deployment comes from the definition of quality as meeting the customer's needs with a minimum loss to society.
- There are several voices to The Customer, including the warfighter (user), the taxpayer (buyer), the contractor (builder), the acquisition expert (manager), and many others.
- Ranking these needs is a team effort, and will result in every team member defining the need. Thus, QFD is process for communication and organization within IPTs.

Quality Function Deployment Terms

- Quality Function Deployment (QFD) can be a set of one or more matrices. Each matrix has problem issues, “*Whats*”, and solution issues, “*Hows*”.
- The matrix elements relates the ranked set of “Whats” to a set of potential “Hows”, summing up these relationships at the bottom to show the relative importance of each “How”.
- The “Hows” of one matrix then are *Deployed* as the “Whats” of the next matrix with subsequent “Hows”.
- Other properties of problem or solution issues are displayed within “*rooms*” of the matrix, such as *Correlation Matrix*, *Target Values*, and *Competitive Assessment*

The Purpose Of QFD

- The purpose of QFD is to identify the most important product and process characteristics for decision support purposes. (Risk, Metrics, Analysis, Etc..)
- This importance can be judged by a numerical score, by graphical notations, or by correlation with other issues.
- The result of a QFD is NOT the chart, but the interpretation of the chart by team members. The matrix is the means, not the end, and needs to be judged.
- A QFD study should be updated throughout the development process, and is not a static document,

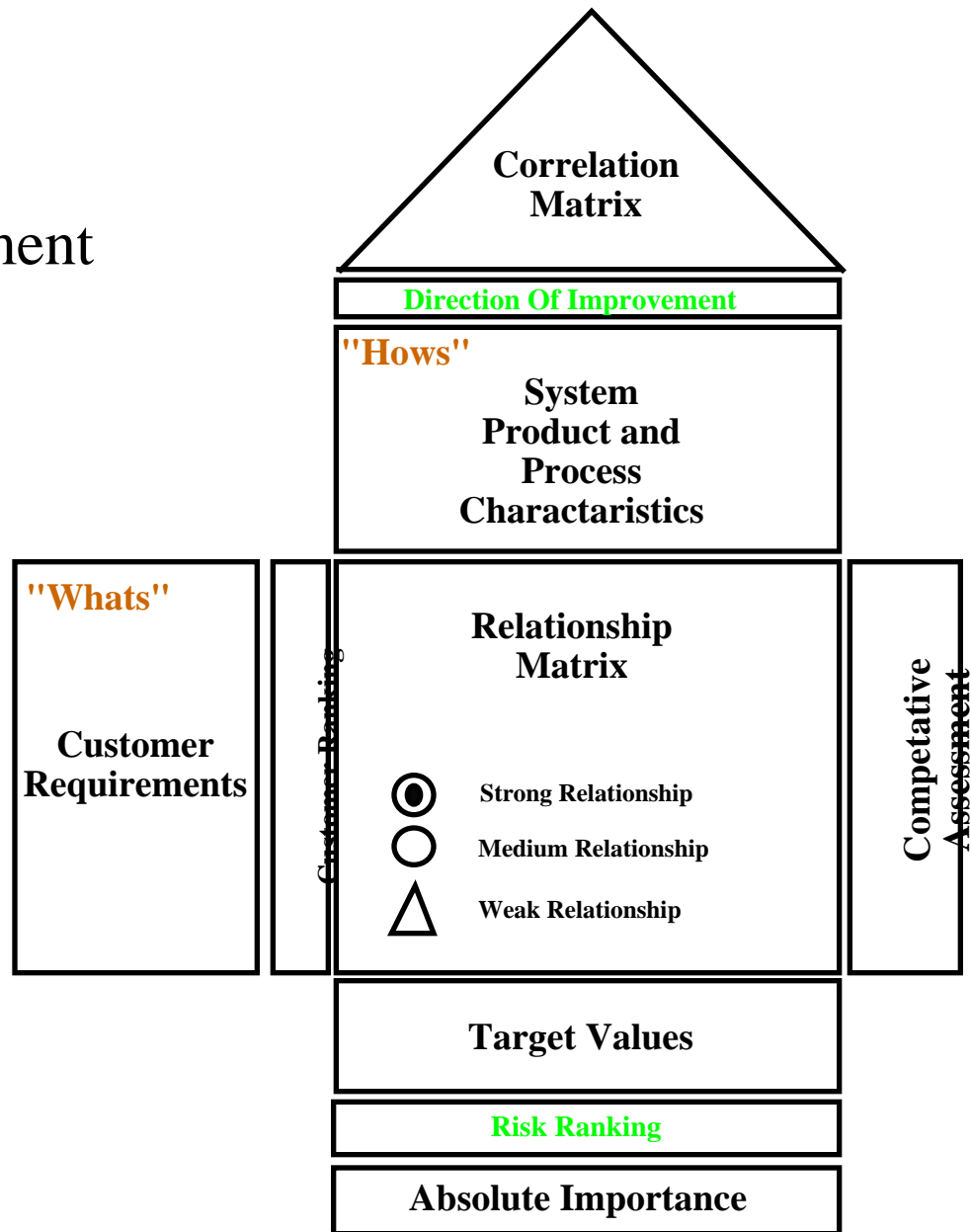
The Elements of the Matrix

- The “Whats” are the left vertical listing for what is desired to be accomplished. In the first matrix, these are the customer requirements.
- The “Hows” are the top horizontal listing of how to achieve or measure the “Whats”.
- The Importance is an absolute or relative ranking of the lowest level of the “Whats”. Scales can be low-medium-high, or from 1-10. This importance is multiplied by the level of relationship.
- The Relationship Matrix is a weak-medium-strong level of relationship between a “What” and a “How”.

The Elements of the Matrix, Continued

- The Correlation Matrix, often called the “roof” on the house of quality, is a measure of the interrelationship between different “Hows”, and can show required tradeoffs. These measures are not reflected in numerical rankings.
- The Absolute and Relative Importance at the bottom of the matrix is a summation of the level of relationship of each “What” multiplied by it’s corresponding importance.
- Other rooms are competitive assessments, target values, direction of improvement, and risk or difficulty.

The Elements Of A Quality Function Deployment Matrix

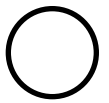


Scales and Symbols Used In QFD

Relationship Matrix and Importance



Strong Relationship = 9



Medium Relationship = 3



Weak Relationship = 1

Correlation Matrix



Strong Positive



Positive

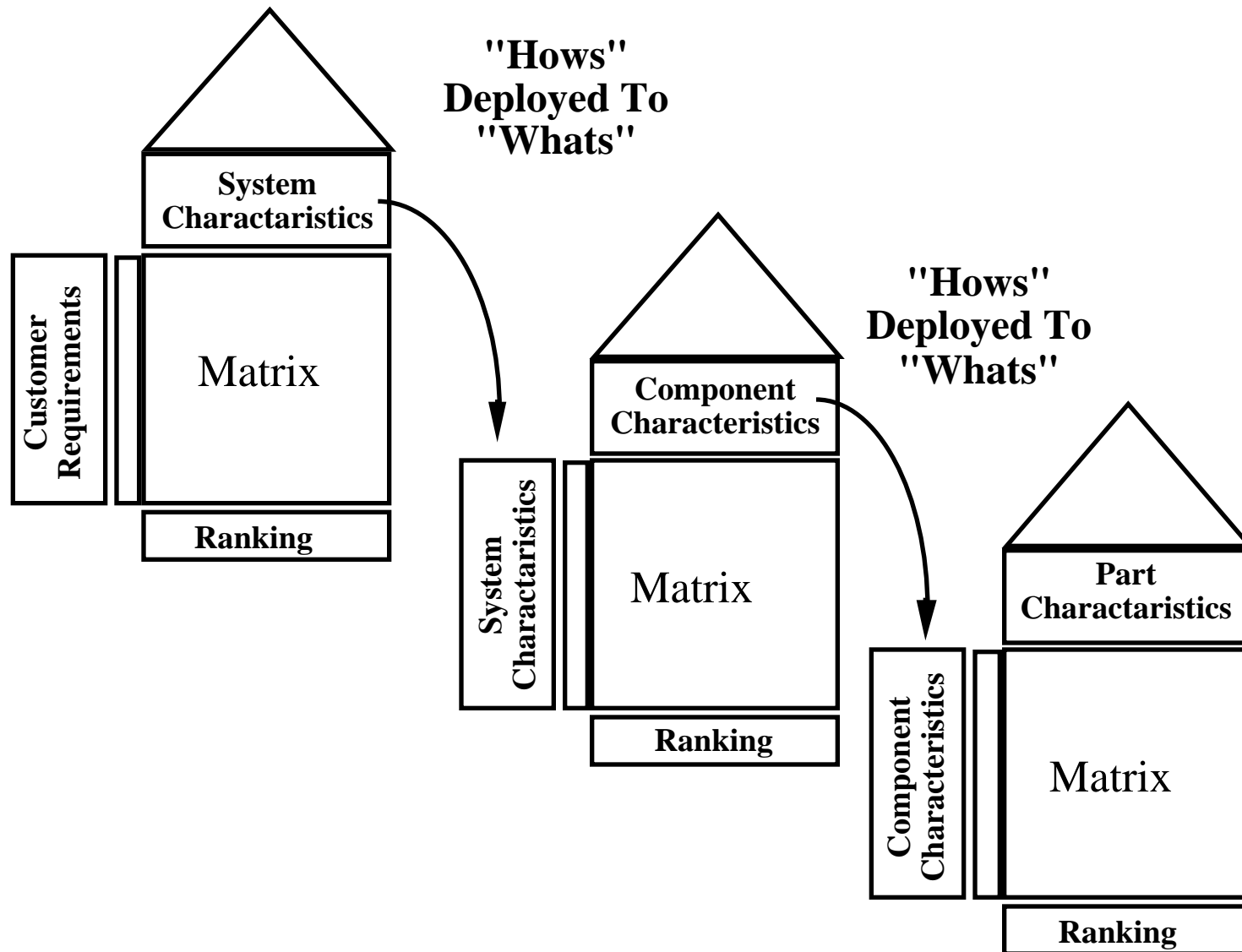


Negative



Strong Negative

Generic QFD Cascade



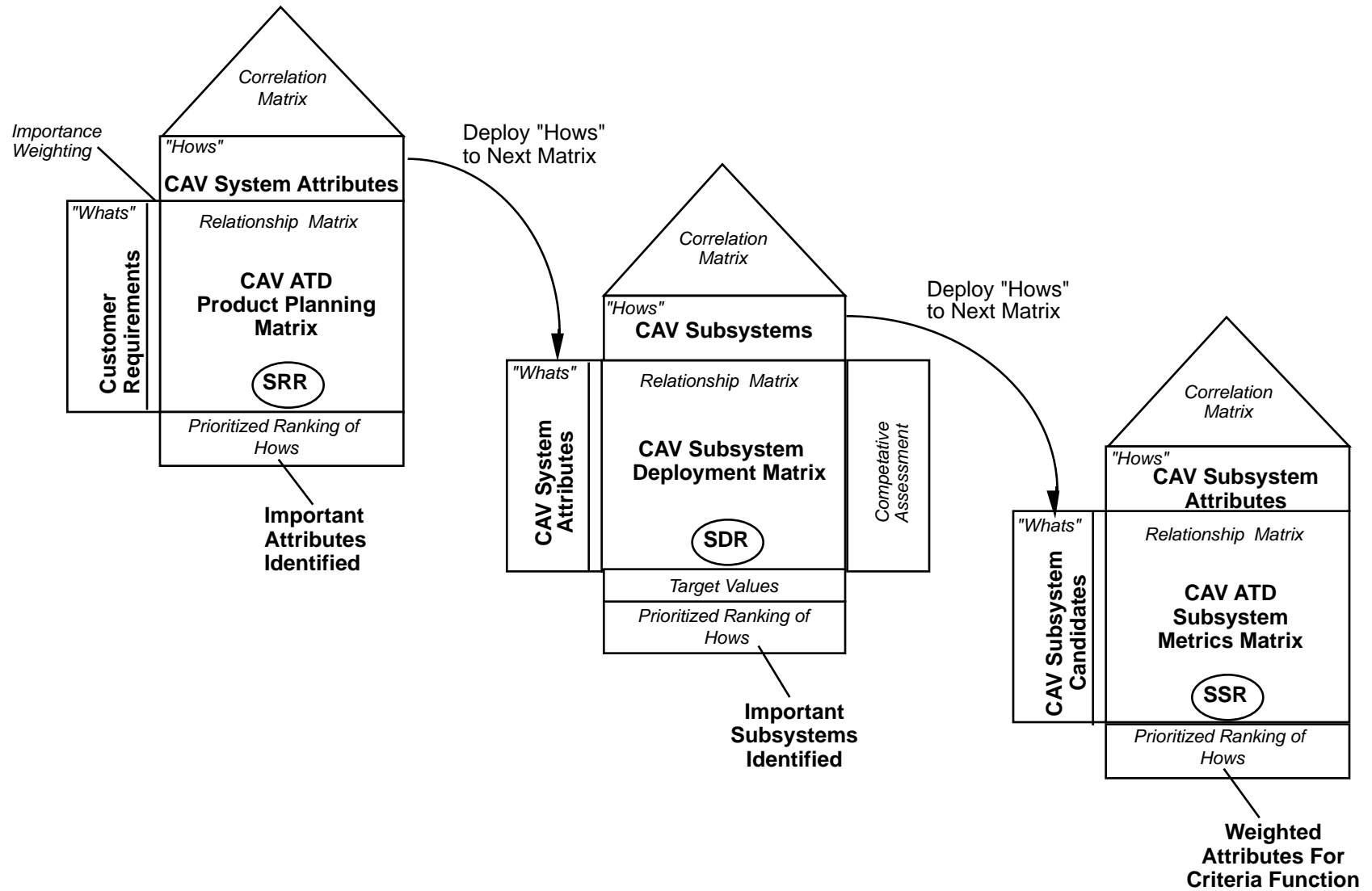
How to Construct a Matrix.

- Decompose “Whats”, and calculate importance. (Affinity, Prioritization)
- Decompose “Hows”. (Tree or Affinity).
- Find Target Values for “Hows”.
- Fill out Relationship Matrix, can use NGT.
- Calculate Relative Importance.
- Determine Direction of Improvement.
- Fill out Correlation Matrix. (Interrelationship)
- Conduct Competitive Assessment for Benchmarking.
- Rank Risk or Difficulty, relative to target values.

Interpreting A QFD Matrix

- The Matrix itself is not the final result of the study, but is a means to draw conclusions about the present knowledge.
- A simple method of showing importance is a bar chart of the calculated importance of each “How”. This can show division levels.
- Scan the relationship matrix for any blank rows or columns, which will show a gap in meeting the customer requirements.
- Find strong negative relationships in the correlation matrix, this highlights tradeoffs.
- Look for crossings on the competitive assessment, these show poor benchmarks.

CAV QFD Cascade

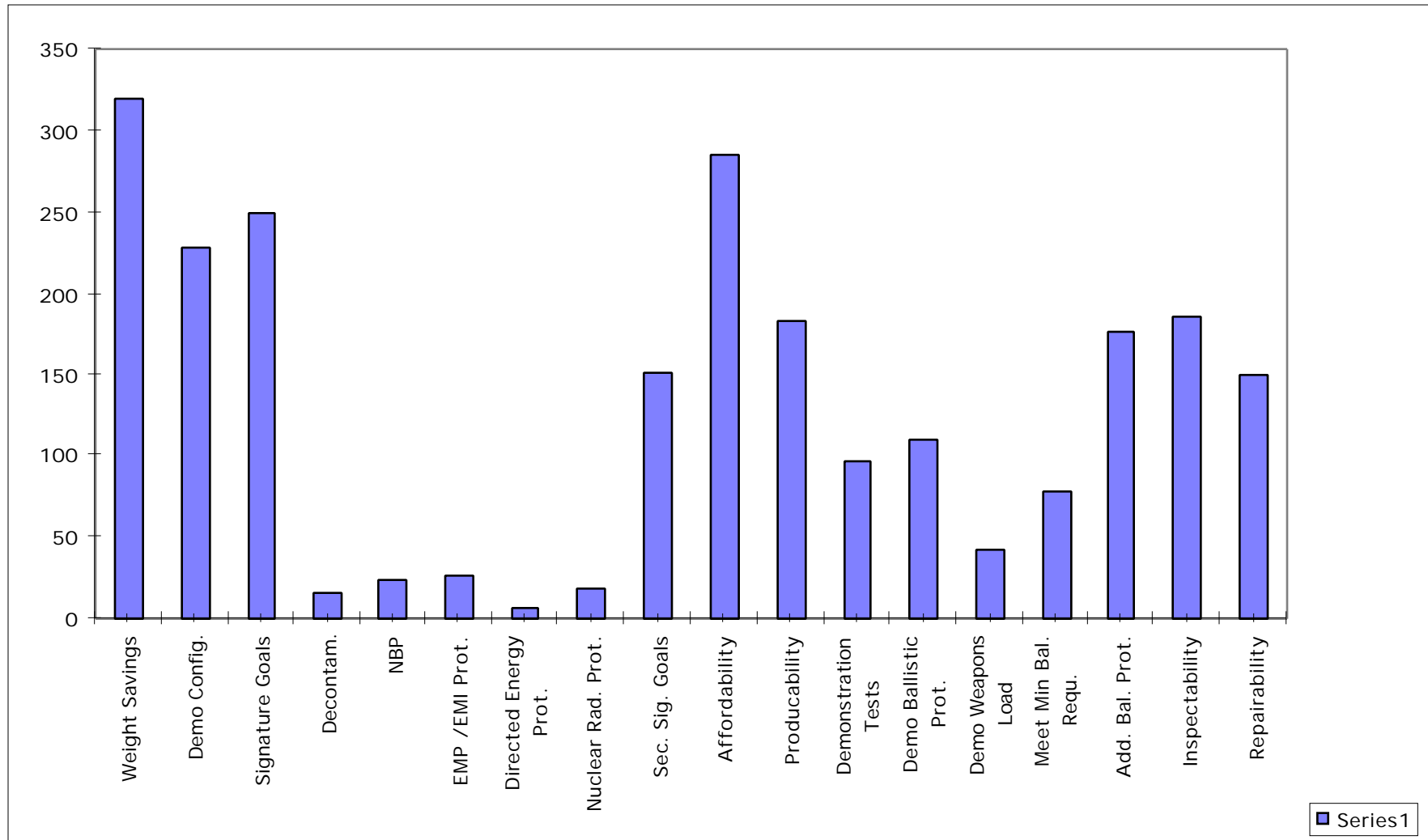


Composite Armored Vehicle: An example of a QFD

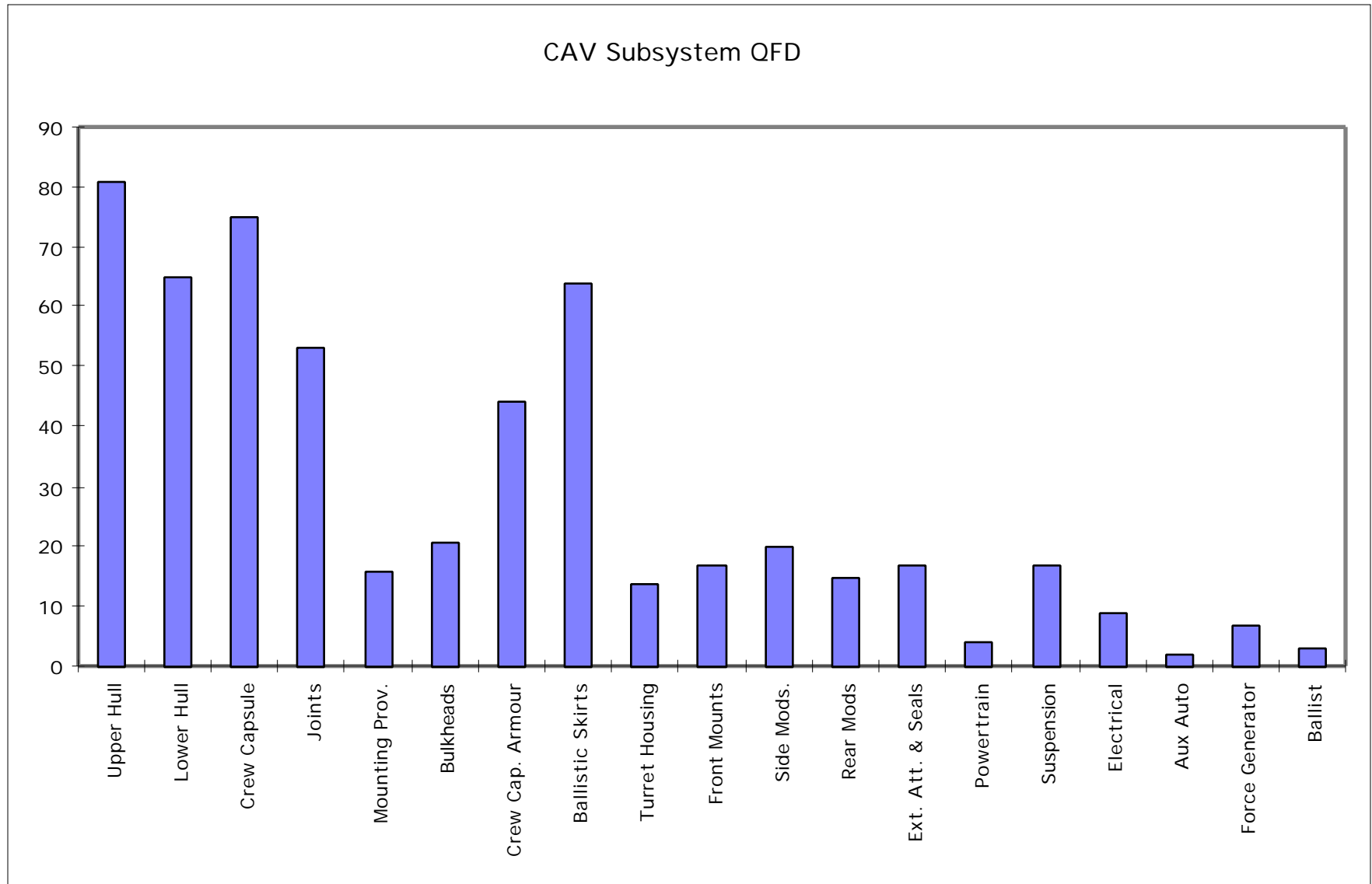
- The Composite Armored Vehicle is an Advanced Technology Demonstration Program to demonstrate technologies necessary to field a vehicle with lower weight, size and signature. Manufacture and support logistics were keys to affordability.
- A QFD cascade was constructed to deploy Customer Requirements to System Attributes and then Subsystems, Metrics, and finally to Alternatives.
- The results of the study agreed with previous studies, but also resulted in the “best communications and discussion” among the product team. Several items were ranked highly because of integration needs, not pure technology needs.

CAV- Identify Important Issues.

Ranked Results of the Product Planning Matrix



CAV- Ranked Subsystems



QFD Exercise

- Each team will produce a basic QFD Matrix for the implementation of a culture change within DoD.
- The objective of the exercise is to practice the construction of the major parts of a QFD matrix, and plan the completion of the study.
- Use the results from the 7 M&P tools exercises to construct a QFD matrix relating *What* is required to change the DoD acquisition process to *How* to accomplish this change. Fill out the relationship matrix, and complete as much of the correlation matrix as possible.

QFD exercise, cont.

- To complete the QFD exercise, draw preliminary conclusions from your early results, and then plan for expanding the study.
- This plan should include what other participants should be involved and how their input could be collected and added.
- Have one member of your team able to present your work.